

09/945,393

REMARKS

It is noted that an error appears in this specification of a clerical/typographical nature, as more fully described in the amendment. The error occurred in good faith. Correction thereof does not involve such changes that would constitute new matter. Please enter the described amendments.

Respectfully submitted,

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TECHNOLOGY CENTER 2800

Application Serial No. 09/945,393
Filing Date August 30, 2001
Inventor Eugene P. Marsh
Assignee Micron Technology, Inc.
Group Art Unit 2812
Examiner Unknown
Attorney's Docket No. MI22-1728
Title: Dielectric Material Forming Methods and Enhanced Dielectric Materials

VERSION WITH MARKINGS TO SHOW CHANGES MADE ACCOMPANYING
SUPPLEMENTAL PRELIMINARY AMENDMENT

In the Specification

The replacement specification paragraphs incorporate the following amendments.

Underlines indicate insertions and ~~strikeouts~~ indicate deletions.

Page 9, paragraph number [0025], and page 11-12, paragraph numbers [0030] and [0031] have been amended as follows:

[0025] Although the principles described herein are indicated as particularly applicable to ~~Ta₂O₅~~ dielectric materials, the invention may be further applicable to other dielectric materials containing tantalum and oxygen, as well as dielectric materials not containing tantalum and/or oxygen. Accordingly, in another aspect of the invention, a dielectric forming method includes chemisorbing a first dielectric material on a substrate and chemisorbing a second dielectric material on the first material, one of the first and second dielectric materials comprising oxygen and a Group IB to VIIIB element. An enhanced dielectric material can be formed containing the first and second dielectric materials. The enhanced dielectric can exhibit a dielectric constant greater than that of the first dielectric material.

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[0030] According to yet another aspect of the invention, a dielectric material forming method includes atomic layer depositing an oxide of Group IVB metal on a first dielectric material containing Ta_2O_5 and forming a second dielectric material containing the chemisorbed oxide and the first dielectric material. As one example, the atomic layer depositing can include chemisorbing at least one Group IVB metal precursor on the first dielectric material followed by purging chemisorption byproducts and excess metal precursor from over the substrate. Exemplary precursors include tetrakis dimethyl amido titanium (TDMAT), zirconium t-butoxide, and other suitable materials as known to those skilled in the art. The metal precursors can be used alone or in combination. For example, titanium and zirconium could be deposited together. In processes where tantalum oxide is also formed by atomic layer depositing, tantalum ethoxy (Taeto) is one example of potentially several suitable precursors.

[0031] The atomic layer depositing may further include chemisorbing an oxygen precursor on the chemisorbed Group IVB metal or tantalum and purging chemisorption byproducts and excess oxygen precursor from over the substrate. A chemisorption product of the Group IVB metal precursor and the oxygen precursor can comprise Group IVB metal oxide. A chemisorption product of the tantalum precursor and the oxygen precursor can comprise a tantalum oxide, for example, Ta_2O_5 . H_2O is one example of potentially several suitable oxygen precursors. However, a more preferable oxygen precursor will be of a type that does not oxidize silicon during ALD.

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